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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter provides an analysis of the potential environmental consequences that would result from implementation of the Proposed Action (Project) (development of federal land or minerals associated with 23 exploratory well locations, access roads, associated facilities, two injection well locations, access roads, associated facilities) or No Action (denial of further federal land or minerals development in the Blue Sky Project Area (Project Area). Measures that would avoid or reduce impacts under the Project have been included in Chapter 2. The following impact assessment takes these measures into consideration. Additional opportunities to mitigate impacts beyond the measures proposed in Chapter 2 are presented in this chapter under the Mitigation Summary for each resource discipline.

As discussed in Chapters 1 and 2, the Project Area lies within the proposed Atlantic Rim CBM Project Area (**Figure 1**). Drilling and field development activities associated with the Project would have to conform with the terms of the Interim Drilling Policy (**Appendix A**), the terms of which do not allow approval of activities that may result in significant impacts to resources.

This analysis of environmental consequences addresses those direct and indirect impacts associated with exploration and development of the Blue Sky Project, and cumulative impacts that would result from past, present, and reasonably foreseeable future actions within a cumulative impact assessment area relevant to the resource being analyzed. The description of the environmental consequences includes the following subsections where applicable:

Direct and Indirect Effects

The level and duration of direct and indirect effects that would occur as a result of the Project or the No Action Alternative. The impact evaluation assumes that the applicant-committed and BLM required practices described in Chapter 2 would be implemented

Mitigation

In addition to the Best Management Practices (BMPs) described in Chapter 2, a summary of additional measures that could be applied to avoid or reduce impacts. Mitigation items specified in the Mitigation Summary are *assumed to be* applicable to impacts on all lands, regardless of ownership. However, Pedco would coordinate with private landowners to determine which measures would be applied, to what degree, and where. Mitigation described would apply to the Project only, as no actions requiring mitigation are contemplated under the No Action Alternative. The measures identified under this section would be considered for application to all BLM administered lands where appropriate. If no additional mitigation is proposed, the mitigation and residual impact sections will not be discussed.

Residual Impacts

A summary of impacts that would remain after the application of additional reasonable mitigation and, therefore, would remain throughout the duration of the Project and to some point beyond.

Cumulative Impacts

A description of impacts likely to occur due to this Project in combination with other ongoing and recently approved activities, recently constructed projects and other past projects, and projects likely to be implemented in the near future (reasonably foreseeable future actions or RFFAs).

This environmental analysis addresses cumulative impacts associated with exploration and development of 200 interim CBM wells and other activities, ongoing or proposed, within the Atlantic Rim Project Area. Cumulative impacts associated with exploration and development of the Blue Sky Project are described later in this chapter, beginning on page 4-26.

GEOLOGY/MINERALS/PALEONTOLOGY

Proposed Action

Use of cut and fill construction techniques to develop well locations, access roads, and facilities would result in the alteration of existing topography. An estimated 78.5 acres would be affected by surface- disturbing activities. Utilization of proper construction techniques described in Chapter 2 would lessen the effects associated with topographic alteration. As discussed in Chapter 3, no major landslides have been mapped within the Project Area. By following prescribed procedures, construction activities would not likely activate landslides, mudslides, debris flows, or slumps. Seismic activity is low in the area, so the potential for damage of Project facilities is minimal.

Drilling of the wells may result in the discovery of CBM resources. This in turn may lead to further exploration to better define the nature of CBM accumulation. If further exploratory information shows an economic accumulation of CBM, then development would likely follow. Recovery of CBM results in the depletion of an in-place resource. If no CBM resources are discovered, then additional exploratory wells may or may not be drilled, depending on the information obtained during drilling of the proposed wells. No other major mineral resources would be affected by implementation of the Project.

As discussed in Chapter 2, Project-Wide Mitigation Measures, the mitigation measures presented in the Soils and Water Resources sections would avoid or reduce potential effects on the surface geologic environment. Implementation of these measures and adherence to federal and state rules and regulations regarding drilling, testing and completion procedures would avoid or reduce potential effects on the subsurface geologic environment.

Under the Project, no effect on any sensitive resource area, such as a high-density paleontological site or stabilized sand dunes, is anticipated. While the surface-disturbing activities associated with the Project could disturb paleontological resources, the potential for recovery of important vertebrate

fossils in the Project Area is considered to be low to moderate. Construction excavation associated with the development of access roads, CBM well pads, gas and water pipelines, and related gas production and water disposal facilities could directly result in the exposure, damage, or destruction of scientifically significant fossil resources. For example, fossils may be subject to damage or destruction by erosion that is accelerated by construction disturbance. In addition, improved access and increased visibility, as the result of construction and ongoing production activity, may lead to fossils being damaged or destroyed by unauthorized collection or vandalism. However, there are no documented occurrences of paleontological resources in the Project Area. The Lewis Shale of Cretaceous age, which underlies the area, has produced scientifically significant fossils elsewhere in Wyoming (and thus meets BLM Condition 2). Mitigation measures discussed in Chapter 2 would protect potential paleontological resources that may be inadvertently uncovered during excavation.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur, although one existing well included in the Project would produce CBM. By not drilling the proposed wells, additional depletion of the CBM resources would not occur. The nation's demand for this resource likely would result in exploration and development elsewhere. Additional information on CBM accumulation in this area of the Washakie Basin would not be obtained and the collective knowledge base would not increase.

AIR QUALITY

Proposed Action

The small number of exploratory wells and Project facilities included in the Project would generate only a small amount of air pollutants. Some temporary effects on air quality would likely occur in the immediate vicinity of Project activities due to particulate matter and exhausts from vehicles and equipment. These effects would be local and would be dispersed by prevailing winds. The effects on air quality would be minimized through the application of dust abatement practices.

No noticeable deterioration in visibility would occur at Class I or sensitive Class II wilderness areas located within 100 miles of Project activities (Mount Zirkel, Rawah, Savage Run, Platte River, Huston Park, or Encampment River). No noticeable deterioration in visibility would occur at the Dinosaur National Monument. Wind dispersion of the small quantity of air pollutants generated by Project activities would likely eliminate the formation of regional haze or acid deposition.

If these wells are deemed economical to produce, Pedco would be required to file an application for an air quality permit from WDEQ for oil and gas production facilities under Section 21 of the Wyoming Air Quality Standards and Regulations.

No violations of applicable state or federal air quality regulations or standards are expected to occur as a result of direct or indirect Project air pollutant emissions from CBM well development (including both construction and operation) in the Project Area.

Under the Project, air emissions would occur from the construction and production of CBM wells within the Project Area. Construction emissions would include PM_{10}, SO_2, NO_x, CO, and VOCs, from ground-clearing, heavy equipment use, drilling, and completion activities, as well as the construction of access roads. Construction emissions are temporary and would occur in isolation, without significantly interacting with adjacent wells.

Production emissions of NO_x, CO, VOC, and HAPs (formaldehyde) would result primarily from operation of compressor engines. Estimated air quality impacts from compressor engines assumed that the compressor engines would have an average potential NO_x emission rate of approximately 2 grams per horsepower-hour (g/hp-hr) of operation. This reflects emission control levels which have already been required in similar applications, although WDEQ-AQD operating permit records have shown existing facility hourly emission levels to be substantially less. The emissions generated from compressor operation would contain negligible amounts of SO_2 and particulate matter due to the composition of coalbed methane gas. Production emissions from the compressor engines would occur over the life of the Project.

Emissions from production wells would be negligible since the produced gas is nearly 100 percent methane and will require no ancillary production facilities at the well site.

Pollutant emissions from the construction and operation of natural gas fields in the vicinity of the Project Area have been analyzed in recent air quality studies performed under NEPA by the BLM. Studies conducted for the Continental Divide/Wamsutter II and South Baggs Natural Gas Development Projects (BLM 1999a and 2000) indicated potential near-field increases in CO, NO_2, PM_{10}, and SO_2 concentrations, however, the predicted maximum concentrations would be well below applicable state and National Ambient Air Quality Standards. Similarly predicted HAP (formaldehyde) concentrations would be below various 8-hour maximum Acceptable Ambient Concentration Levels, and the related incremental cancer risks to residences would also be below applicable significance levels

The emissions resulting from the implementation of this Project would be much the same as those found on similar oil and gas projects such as Continental Divide, but on a much smaller scale. The 23-well exploratory Project described in this EA is within the limit of the 3,000-well air quality analysis prepared for the Continental Divide EIS, considering only 2,130 wells were approved. The analysis for the Continental Divide EIS project included impacts to Class I areas from oil and gas development in southern Wyoming. Based on the relative size of the Project when compared to the magnitude of those projects, no ambient air quality standards would be violated and no adverse air quality conditions would result from the Project.

Mitigation

Emission levels could be further reduced by implementing the following type of control measures including; reduction of compression requirements, electric compression, or the use of nonselective catalytic reduction (NCR), lean combustion, or selective catalytic reduction (SCR) control technologies. Currently, emission levels are below Wyoming Air Quality Standards and the likelihood of requiring these measures is small.

Residual Impacts

Implementation of mitigation, if necessary, would further reduce air quality emissions.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on air quality would be expected to occur beyond the current situation.

SOILS

Proposed Action

Soil stability and productivity may be affected in areas where well sites, facilities, and access roads would be constructed under the Project. An estimated 78.5 acres would be affected by surface-disturbing activities during drilling and testing. Use of BMPs during construction, operation, and reclamation activities would minimize effects on soil resources. Practices that Pedco has committed to in Chapter 2 and existing regulatory requirements would conserve soil resources through timely and effective erosion control and revegetation in disturbed areas, and collectively, would represent BMPs. Topsoil salvaged on sandy sites would be subject to wind erosion until replaced during reclamation or stabilized by a vegetative cover. Uncontrolled runoff from the wells sites could cause accelerated water erosion; however, BMPs for erosion control would be employed as necessary. The application of these BMPs would result in minimal impacts on soil resources.

Should the CBM exploratory wells be productive, the surface areas required for production facilities would not be reclaimed until production ends, which could be as long as 20 years. An estimated 34.8 acres could be affected by production facilities over the long-term.

Approximately 78.5 acres of soils resources would be temporarily disturbed during drilling and field development; after initial reclamation, approximately 34.8 acres would remain disturbed over the life of the Project (**Table 2-3**).

Increased susceptibility to wind and water erosion would be a direct impact in newly-disturbed areas and may cause sedimentation in drainage channels or impoundments. Soil compaction caused by equipment traffic or by increased raindrop impact after loss of surface vegetation cover would decrease infiltration and percolation, increase runoff, and reduce overall water storage capacity. Susceptibility to erosion would occur primarily in the short-term and would decline rapidly over time due to the use of proper construction and reclamation techniques and the implementation of mitigation measures described in Chapter 2.

Due to the high amount of salt or sodium content/high clay material within the Project Area disturbance and/or use of this material is discouraged. Sodium affected soils could contaminate suitable material and cause dispersion of clays and sealing of reclaimed surfaces. Other direct chemical effects on the soil resource could also include reduction of overall fertility based on length

of stockpiling of material and loss of nutrients, and possible oxidation and release of elements such as boron or selenium, although no analyses were conducted.

Stripping of high clay material, surface sandy or gravelly material, as well as channery material in the subsoil, could reduce the physical suitability of the soil resource used for reclamation. If stripped and stockpiled with suitable material, contamination could result in increased droughtiness and decreased fertility, of reclamation material, as well as hamper actual seeding operations. Other physical effects on the soils resource during stripping may include: loss of soil structure and decreased permeability, mixing of various textures, and solution of surface organic matter and subsequently soil biota. Stockpiling soil material could degrade physical properties of the soil resource such as bulk density, in addition to the biological and chemical effects mentioned earlier. In addition, stockpiling of material can increase the potential for soil loss until the soil is revegetated.

Topsoil quality in the Project Area varies based on local topography and source of parent material. Primary limitations overall include: salt or sodium content, high clay content, thin soil development or inaccessibility to stripping operations, channery or high coarse fragment content, or sandy or gravelly soils. Revegetation potentials range from mostly fair to poor, with some areas rated as good. In addition to these limitations, low annual precipitation, susceptibility to wind and water erosion, and short growing season could make reclamation in the Project Area more difficult.

Due to the small area of disturbance and use of proper construction and reclamation techniques and implementation of mitigation described in Chapter 2, impacts to soil resources in the Project Area are anticipated to be minimal.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on soils would be expected to occur beyond the current situation, , where one existing well included in the Project currently affects about one acre.

WATER RESOURCES

Proposed Action

With the use of proper construction techniques, drilling practices, and with the implementation of BMPs, no adverse effect on groundwater aquifers and quality would be anticipated under the Project. Groundwater would be removed from the coal seam aquifers within the Allen Ridge and Almond Formations, members of the Upper Cretaceous Mesaverde Group. CBM testing activities likely would lower the hydraulic pressure head in the affected coal seam aquifer. The reduction of hydraulic pressure head in an aquifer also is referred to as drawdown. Relative to the available drawdown within the aquifer, effect on the coal aquifer during the interim drilling project is expected to be minimal.

The water level in an existing BLM water well completed in the Mesaverde aquifer also may be lowered or drawn down. The potential yield from the nearby water well also may be affected by the removal of groundwater under the Project. Other wells completed in the coal seams could be affected by activities under the Project, however, no other wells permitted by the WSEO are known to occur within a mile of the Project Area. Minimization of potential effects on water wells would be accomplished by the use of a water well agreement and other measures described in Chapter 2 and in the Water Management Plan (**Appendix D**).

These targeted coal seams are classified as confined to semi-confined aquifers because they are bound by aquitards consisting of impervious to semi-pervious layers of shale and siltstone. Hydraulic connection between the coal seams and any aquifer stratigraphically above or below the coal seams is therefore very limited. The hydrostatic pressure head of the water measured in coal seam test wells completed in the Project Area can be considerably higher (100 to 300 feet higher) than the ground level elevation at any respective well location. Confined, or artesian, aquifer conditions of this type are indicative of an effective seal or aquitard above and below the aquifer. However, lowering of the hydraulic pressure head in the coal seam aquifers by water removal may induce a slight leakage of water through the semi-pervious shale layers into the pumped aquifer. Due to extremely low hydraulic conductivity of the confining layers, enhanced leakage from any aquifer stratigraphically above or below the affected coal seams would be minimal.

CBM exploratory wells would produce water that would be disposed of in two injection wells. The proposed injection targets for each injection well are the Cherokee and Deep Creek Sandstones, located approximately 4,170 and 4,450 feet below the surface, respectively, stratigraphically below the coal zones being explored. Background water quality analyses of the injection horizon currently are not available, but it is anticipated that the CBM produced water that would be injected would be of equal or higher quality in regards to class of use as defined by WDEQ-GWD regulations. Injection of the CBM produced water is not expected to result in any deterioration in groundwater quality within the injection horizon. These sandstones are isolated above and below by competent shale barriers that would prevent the initiation and propagation of fractures through overlying strata to any fresh water zones. The only effect on the injection horizons would consist of an increase in hydraulic head emanating from the injection well, which would dissipate with distance away from the wellbore. In terms of water quantity and quality, the Proposed Action's effect on the injection horizon would be minimal.

The fracture gradient of the shale aquitards that overlie and underlie the injection horizons would not be expected to be exceeded, so all injected water would be contained in the injection horizon and would not migrate vertically. For this reason, the injected water is not expected to degrade water quality of the Mesaverde aquifer.

The groundwater would be removed from a formation that is stratigraphically lower and hydraulically isolated from shallow groundwater sources that typically are developed with water wells. The proposed injection zone is also stratigraphically lower than the shallow groundwater sources. Shallow groundwater sources (stratigraphically above the Mesaverde coal zones) are not likely to be affected by the Project.

Monitoring of the quality of CBM produced water, the volume of water produced over time during testing, and the static water levels in nearby wells before, during, and after completion of Project activities would provide information about the groundwater system in the Project Area. This information also would be used to quantify interim drilling project impacts for use in evaluating future field development.

As all produced water is to be injected under the Project, surface water quality or quantity would not be affected directly by the disposal of produced water. Pedco would implement BMPs to ensure spills of produced water do not occur.

Surface disturbance associated with drilling activities, such as removing vegetation and stockpiling topsoil, road construction, or shallow excavations for drill pads or facilities, would increase the potential for erosion or bringing increased sediment and salt load to the already overburdened Muddy Creek drainage. Pedco would implement the mitigation measures described in Chapter 2 to control wind and water erosion at disturbed sites so that the drainage is not affected by interim drilling activities. Practices that Pedco has committed to in Chapter 2 and existing regulatory requirements would include the design of surface-disturbing activities in a manner that diverts and controls runoff, as needed, and provides for the re-establishment of vegetation on disturbed areas at the earliest opportunity. These measures, collectively, would represent BMPs for erosion control. The application of these BMPs would result in minimal impacts on water and soil resources.

Potential impacts that could occur to the surface water system under the Project include increased surface water runoff and off-site sedimentation due to soil disturbance, water quality impairment of surface waters, and stream channel morphology changes due to road and pipeline crossings. Effects on surface water resources would depend on the proximity of the disturbance to a drainage channel, slope aspect and gradient, degree and area of soil disturbance, soil character, duration of time within which construction activities occur, and the timely implementation and success/failure of mitigation measures. Increased sedimentation is not expected to occur as a result of the implementation of the Project due to compliance with measures described in Chapter 2.

Construction activities would occur over a relatively short period of time. Construction impacts would likely be greatest shortly after the start of the Project and would decrease in time due to stabilization, reclamation, and revegetation efforts. The construction disturbance would not be uniformly distributed across the Project Area, but rather, Project construction activities would be concentrated within and around the wells.

Water for use in drilling the initial CBM well in the Project Area would be obtained from a local source and water for drilling the remaining wells would be obtained from the first well drilled. The Project would require approximately 84,000 gallons (0.26 acre-foot) of water per well for completion, well stimulation and dust control. This water requirement is relatively small and would not adversely affect existing surface or groundwater sources or rights.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on water resources would be expected to occur beyond the current situation.

VEGETATION/WETLANDS/NOXIOUS WEEDS

Proposed Action

Implementation of the Project would result in the loss of natural vegetation in terms of cover and species composition in areas where well sites, facilities, and access roads would be constructed. An estimated 78.5 acres would be affected by surface-disturbing activities during drilling and testing. To avoid permanent loss of species diversity and vegetative cover, topsoil would be stockpiled, and reclaimed areas would be seeded with site-specific mixes during appropriate planting periods.

Should the CBM exploratory wells be productive, the surface areas required for production facilities would not be reclaimed until production ends, which could be within five to fifteen years. An estimated 34.8 acres could be affected by production facilities over the long-term.

Indirect effects would include increased potential for weed invasion, exposure of soils to accelerated erosion, loss of habitats and changes in visual aesthetics. Use of BMPs described in Chapter 2 during construction, operation, and reclamation activities would minimize effects on vegetation resources. Weed monitoring would occur during drilling, production, and reclamation activities. Weeds found would be eradicated following county control procedures. Properly reclaimed areas free of weed species would not cause loss of habitat or change visual aesthetics.

The Wyoming big sagebrush, greasewood, and saltbush cover types that would be disturbed under the Project are commonly found across southwest Wyoming. The short-term or long-term loss in acreage described above would not impact the overall abundance and quality of these habitats.

In general, the duration of effects on vegetation in the Project Area would depend on the time required for natural succession to return disturbed areas to pre-disturbance conditions of diversity (species diversity and structural diversity). Reestablishment of pre-disturbance conditions would be influenced by climatic (growing season, temperature, and precipitation patterns) and edaphic (physical, chemical, and biological soil conditions) factors. This would include the amount and quality of topsoil salvaged, stockpiled, and spread over disturbed areas.

Surface disturbance activities could affect vegetation directly and indirectly by destroying individuals or their habitat, and introducing weeds. Weedy species often thrive on disturbed sites such as road ROWs and out-compete more desirable plant species. Increased weed invasion may render a site less productive as a source of forage for wildlife and livestock. However, given the application of mitigation measures summarized in Chapter 2, invasion of weed species is not expected.

No federally listed threatened or endangered plant species are known to occur in the Project Area; therefore, implementation of the proposed development would not adversely impact federally-listed species.

The distribution of plant species of concern is likely limited in the Project Area due to a lack of suitable habitat for most of the species. Due to the low likelihood of the sensitive plant species to occur in the Project Area and the small amount of disturbance associated with the Project, no effects on the plant species of concern would be expected to occur.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on vegetation resources or wetlands would be expected to occur beyond the current situation.

RANGE RESOURCES AND OTHER LAND USES

Proposed Action

Anticipated effects on range resources associated with the Project are limited to a minimal loss of forage, an increased potential for vehicle/livestock collisions and an increased potential for the spread of noxious and invasive weeds (previously discussed above under Vegetation/Wetlands/Noxious Weeds). The Project would not be likely to result in noticeable effects on range resources.

Livestock grazing activities would continue during the drilling, field development and operations phases of the Project. Forage in the Project Area would be reduced slightly during drilling and field development and restored as soon as practical thereafter, except for areas used for roads, production equipment and ancillary facilities, which would remain disturbed throughout the productive life of the field. The increased traffic in the Project Area during the drilling and field development phase could correspondingly increase the potential for vehicle/livestock accidents during that period.

The Project would result in an estimated 78.5 acres of short-term disturbance during drilling and field development; an estimated 34.8 acres of long-term disturbance would remain after the initial reclamation activities described in Chapter 2 are completed (**Table 2-3**). The short-term drill pad and ancillary facility disturbance would be reclaimed as soon as practical after field development, as would all areas disturbed for gas and produced water pipelines. All remaining disturbed areas would be reclaimed at the end of field operations, except those facilities which the BLM may identify as desirable for another use.

The average stocking rate for the Doty Mountain Allotment is 12 acres per AUM and 8 acres per AUM for the Cherokee Allotment. The Project would result in a short-term loss of forage associated with about three AUMs in the Doty Mountain Allotment and five AUMs in the Cherokee Allotment. This would correspond to a very small long-term reduction in available forage within

the Doty Mountain and Cherokee Allotments. These losses would amount to substantially less than one percent of the total grazing capacity in these areas.

There is potential for conflict between activities under the Project and range operations. The increased activity associated with drilling and field development could result in increased vehicle/livestock collisions. The activities under the Project also could benefit range operations. Reclamation may result in increased forage production and availability, since shrubs would be removed in disturbance areas, and shrub species would be slow to recover.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on range resources would be expected to occur beyond the current situation.

WILDLIFE/FISHERIES

Proposed Action

The effects on wildlife would be associated with Project construction and operation, including the displacement of some individuals of some wildlife species, loss of wildlife habitats due to the development of drilling and production operations, an increase in the potential for collisions between wildlife and motor vehicles, and an increase in the potential for illegal kill, harassment, and disturbance of wildlife due to increased human presence and improved vehicle access. The magnitude of impacts to wildlife resources would depend on a number of factors including the type and duration of disturbance, the species of wildlife present, time of year, and successful implementation of avoidance and mitigation measures.

The effect of the Project would be the short-term loss of natural habitats in areas where well sites, facilities, and access roads would be constructed. An estimated 78.5 acres would be affected by surface-disturbing activities during drilling and testing.

Should the CBM exploratory wells be productive, the surface areas required for roads or production facilities would not be reclaimed until production ends, which could be within five to fifteen years. An estimated 34.8 acres could be affected by production facilities over the long-term.

Construction, operation, and maintenance of the proposed CBM wells and associated facilities are expected to have minimal short-term effects on wildlife in the Project Area. Some wildlife species may be temporarily displaced during the construction on pipeline routes, well sites and access road locations, but should return once construction is complete. Extensive suitable habitats for many species exist on lands adjacent to the Project Area and would support any individuals that may be temporarily displaced. Long-term effects on wildlife are expected to be minimal, as most species would become accustomed to routine operation and maintenance activities. Only a very small proportion of the available wildlife habitats in the Project Area would be affected. The capacity of

the Project Area to support various wildlife populations should remain essentially unchanged from current conditions.

During the production phase, the unused portion of well sites and pipelines would be reclaimed. Following completion of production operations (life of the Project is estimated at 10-20 years), the well field and ancillary facilities would be reclaimed and abandoned. Well pads would be removed and the areas revegetated with seed mixes approved by the BLM, some of which are specifically designed to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to pre-disturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation, however, much more time would be required to achieve reestablishment of shrub communities. Consequently, disturbance of shrub communities would result in a longer-term loss of those habitats.

In addition to the direct loss of habitat due to construction of well pads and associated roads and pipelines, disturbances from human activity and traffic would lower wildlife utilization of habitat immediately adjacent to these areas. Species that are sensitive to indirect human disturbance (noise and visual disturbance) would be affected most. Habitat effectiveness of these areas would be lowest during the construction phase when human activities are more extensive and localized. Disturbance would be reduced during the production phase of operations and many animals may become accustomed to equipment and facilities in the gas field and may once again use habitats adjacent to disturbance areas.

Wildlife

The direct disturbance of wildlife habitat in the Project Area likely would reduce habitat availability and effectiveness for a variety of common small mammals, birds, and their predators. The initial phases of surface disturbance and increased noise levels likely would result in some direct mortality to small mammals and the displacement of songbirds from construction sites. In addition, a slight increase in mortality from increased vehicle use of roads in the Project Area would be expected. Quantification of these losses is not possible; however, the loss is likely to be low over the short-term. During the operations phase of the Project, increased noise levels from compressor engines and other production activities would displace some animals and would affect the production potential of some species. Due to the relatively high production potential of these species and the relatively small amount of habitat disturbed, small mammal and songbird populations would quickly rebound to pre-disturbance levels following reclamation of pipelines, unused portions of roads, well pads, and wells that are no longer productive. No long-term effects on populations of small mammals and songbirds would be expected.

Big Game

In general, effects on big game wildlife species would include direct loss of habitat and forage, and increased disturbance and noise from drilling, construction, operation, and maintenance operations. Disturbance of big game species during the parturition period and on winter range can increase stress and may influence species distribution (Hayden-Wing 1980, Morgantini and Hudson 1980). There may also be a potential for an increase in poaching and harassment of big game, particularly

during winter. According to management directives in the RMP (BLM 1990), crucial big game winter ranges will be closed to construction and development activity from November 15 through April 30. This partial closure of crucial big game winter ranges would reduce disturbance to wintering big game. This partial closure would also limit the potential for poaching and/or harassment of big game species wintering in the area. Recreational use of the area and production activities would not be affected by the partial closure.

Effects on big game are expected to be minimal, as the Project Area represents less than one-tenth of a percent of any species winter or year-long range (HWA 2001). No long-term habitat loss is expected once construction is complete, as big game species are expected to return to the area.

A portion of the Project Area has been designated as crucial winter range for pronghorn antelope. Activities associated with the construction phase of the Project would likely temporarily displace antelope, however, once construction is complete antelope would likely habituate and return to pre-disturbance activity patterns. Reeve (1984) found that pronghorn acclimated to increased traffic volumes and machinery as long as the traffic and machines moved in a predictable manner. Overall, no noticeable effects on the antelope population utilizing the Project Area are expected, provided mitigation measures contained in this document, the RMP, and the Interim Drilling Policy are implemented.

Upland Game Birds

No noticeable effect on the greater sage grouse population is expected provided all applicant-committed and BLM-required mitigation measures described in Chapter 2 are followed. The Project Area is considered a sensitive resource area and mitigation measures described in Chapter 2 and included as Application for Permit to Drill (APD) conditions of approval must be followed to protect this area.

Well site production facilities often act as raptor perches, increasing predation on greater sage grouse and other wildlife. Use of low profile structures should mitigate these potential effects if any wells produce commercial quantities of CBM.

Although no active leks are located in the Project Area, suitable greater sage grouse habitat is abundant. The amount of habitat disturbance would be minimal, considering the amount of habitat available in the Project Area. However, greater sage grouse can be impacted by other activities associated with CBM development, including increased human activity, increased traffic disturbance, and pumping or compressor engine noises. Increased noise levels occurring in sensitive resource areas could affect the ability of greater sage grouse to carry out mating activities. Careful siting of noise sources, addressed in applicant-committed and BLM-required mitigation measures in Chapter 2 and in the Blue Sky Project, would result in minimal effects on greater sage grouse.

The RMP contains mitigating measures that protect the nesting activities of greater sage grouse from February 1 to July 31, including strutting grounds and nesting habitat. Exceptions may be granted if the activity will occur in unsuitable nesting habitat. No surface occupancy stipulations apply within a one-quarter mile buffer around active leks, however there are no NSO areas located in the Project Area associated with greater sage grouse leks. The portion of the Project Area included

within the two-mile buffer of an active greater sage grouse lek is a sensitive resource area according to the Interim Drilling Policy and mitigation measures must be followed to protect this area, especially during time periods when greater sage grouse mating activities could be affected by noise associated with the Project. If all avoidance and mitigation measures in this document, the RMP, and the Interim Drilling Policy are implemented, minimal impacts to greater sage grouse populations or habitats are expected.

Raptors

Above-ground power lines are not included in the Project, and are not considered here. The principal potential effects of the Project on avian species would be nest abandonment and/or reproductive failure caused by Project-related disturbance and increased noise levels, increased public access and subsequent human disturbance resulting from new construction or production activities, and small, temporary reductions in prey populations for raptors. However, no active raptor nests were found within or near the Project Area during a 2001 survey.

No effects on breeding raptors are expected, provided avoidance and mitigation measures are followed. Oil and gas mitigating measures contained in the RMP state that no activity or surface disturbance would be allowed near raptor nesting habitat from February 1 through July 31. The size of the restrictive radius and the timing restriction may be modified depending on species of raptor and whether the nest is within the line of sight of construction activities. No effects on breeding raptors are expected, provided that avoidance and mitigation measures in this document, the RMP and the Interim Drilling Policy are followed.

Threatened and Endangered Species - Wildlife and Fish

Wildlife Species

The following wildlife species are either threatened, endangered, or proposed for listing under the ESA: black-footed ferret; mountain plover; bald eagle; and Canada lynx. These species may have potential to occur on or near the Project Area and therefore potential impacts to these species that could occur under the Project are considered.

In Wyoming, white-tailed prairie dog colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs for food, and they depend upon prairie dog burrows for shelter, parturition, and raising young (Hillman and Clark 1980). A large portion of the Project Area consists of prairie dog towns having sufficient size and burrow densities to be considered potentially suitable habitat for black-footed ferrets (HWA 2001). Prairie dog towns must be greater than 200 acres and have a burrow density greater than or equal to 8 burrows/acres in order to be considered suitable for black-footed ferrets (Biggins et al. 1989). However, no ferrets or their sign were found during a nocturnal survey over the entire prairie dog town conducted in August 2001 (HWA 2001). Implementation of the Project would not be expected to impact black-footed ferrets.

Although no mountain plovers were found during 2001 surveys, the presence of prairie dog towns indicates that plovers may use these areas during some times. The potential exists for effects on mountain plovers if nesting habitat were removed or an active nest were disturbed. However, two patches of potential mountain plover habitat were surveyed in 2001 and no mountain plovers were observed (HWA 2001). If mountain plovers are observed on the Project Area in the future, the avoidance and mitigation measures in this document, the RMP, and the Interim Drilling Policy would be followed to ensure no significant impact to mountain plovers occurs. Implementation of the Project is not expected to affect mountain plovers, provided any required avoidance and mitigation measures are implemented.

The Project is not expected to affect bald eagles provided avoidance and mitigation measures outlined in this document, the RMP, and the Interim Drilling Policy are implemented. Bald eagles do feed on road-killed carrion in the Project Area and workers should be educated about the danger of striking a bald eagle with a vehicle.

The Canada lynx is not expected to occur within the Project Area because of the lack of potentially suitable habitats. Thus, the implementation of the Project is not expected to affect Canada lynx.

Fish Species

The lack of large river habitat within the Project Area precludes the occurrence of adults of the four species of endangered fish. Additionally, critical habitat has not been established anywhere in Wyoming for any of these species (Upper Colorado River Endangered Fish Recovery Program 1999).

Depletions to the Colorado River resulting from reduced groundwater discharge (base flows) are not expected due to the Project's distance from the Colorado River and the subsurface orientation, or bedding attitude, of the aquifers contained in production formations that would be affected by the Project. Orientation of the Mesaverde aquifer would preclude groundwater contained in the coal zone being produced from discharging as base flow to the Colorado River or its tributaries (Whitehead 1996). Therefore, removal of groundwater from the Mesaverde aquifer during the Project would not be expected to affect base flows of the Colorado River or its tributaries.

Water quality effects on the Colorado River resulting from reduced quality of groundwater discharge (base flows) are not expected due to the Project's distance from the Colorado River and the subsurface orientation, or bedding attitude, of the aquifers contained in injection formations that would be affected by the Project. Orientation of the injection zone formations would preclude groundwater being injected from discharging as base flow to the Colorado River or its tributaries (Whitehead 1996). Therefore, injection of produced water during the Project would not be expected to affect base flows or water quality of the Colorado River or its tributaries.

Confining layers are expected to preclude interaction between the injection and production formations. No major faults are known to occur in the area. Faults, if present, could serve as conduits for water to migrate between formations. Improperly completed wells also could serve as conduits for water to migrate, unless drilling practices specified by the BLM and the WOGCC are strictly followed.

No surface water withdrawals from Colorado River system drainages are included in the Project, and no surface discharge of produced water is planned. The Project would not be expected to affect surface water quantity or quality of the Colorado River or its tributaries. The course of the Colorado River comes no closer than 140 miles to the Project. In order for surface water in drainages in the Project Area to reach the Colorado River, water would have to flow from Muddy Creek to the Little Snake River to the Yampa River to the Green River, finally reaching the Colorado River in southeastern Utah.

Colorado Pikeminnow

Although Muddy Creek and the Little Snake River may potentially support this species of fish at certain times, this species is absent downstream from the Project Area. The Project would have no impact on this species.

Bonytail and Humpback Chub

These species are absent downstream from the Project Area, therefore the Project would have no impact on these species.

Razorback Sucker

Suitable habitat is not available in the Little Snake River drainage, therefore, the Project would have no impact on this species.

Within Muddy Creek, sediment levels may be elevated during construction of well access road crossings and road grade along and across the creek. Implementing reasonable precautions to limit offsite sediment movement from these areas would prevent substantial increases in sediment loadings in the downstream section of Muddy Creek and downstream from its confluence with the Little Snake River, and would avoid violation of Wyoming Surface Water Quality Standards (WDEQ 2001). Because the limited water development and usage for this Project are predicted to only affect subterranean aquifers related to the coal seams, surface flows would not be affected by wells developed for this Project.

The occurrence of these endangered fish species has not been confirmed in the Muddy Creek drainage or immediately downstream in the Little Snake River, and their occurrence is highly unlikely. If any of these species are identified within the downstream portion of Muddy Creek or immediately downstream in the Little Snake River, the BLM should consult with the FWS and develop a protection plan for the fish. Given these precautionary measures, no adverse impacts to any of these species would be expected to result from the implementation of the Project.

Species of Concern - Wildlife and Fish

Wildlife

Effects on BLM wildlife species of concern could occur due to loss of habitat or displacement due to increased noise levels. Due to the relatively small size of the Project Area, the inherent mobility of the species of concern, and abundance of nearby potentially suitable habitats, no noticeable effects are expected under the Project, provided avoidance and mitigation measures outlined in this document, the RMP, and the Interim Drilling Policy are followed.

Fish

If measures to prevent downstream sedimentation are implemented to prevent offsite movement of fluid spills (if any occur) or disturbed soils caused by construction activities under the Project (WDEQ 1997 and 2000), implementation of the Project is not likely to adversely effect BLM sensitive fish species occurring within or downstream of the Project Area. Implementation of reasonable precautions to limit offsite sediment movement should prevent violations of Wyoming Water Quality Standards (WDEQ 1997 and 2000). Further, to avoid depletion of Muddy Creek and Little Snake River surface flows, and subsequent adverse impacts to these species due to surface or near surface water removals for well site use, water would be drawn from deep aquifer wells. Stream crossings of Muddy Creek, Cow Creek, and Dry Cow Creek will be constructed to provide passage for upstream spawning migrations of these sensitive native fishes. Given these precautionary measures, implementation of the Project is not likely to adversely effect the roundtail chub, bluehead sucker, flannelmouth sucker, or Colorado River cutthroat trout.

Mitigation

The BLM may require that noise levels be limited to no more than 10 dBA above background levels at greater sage grouse leks and other sensitive resource areas. In order to comply with the above noise level limits, the BLM may require compressor engines to be enclosed in a building and located at least 600 feet away from sensitive receptors or sensitive resource areas (BLM 1999b).

Residual Impacts

Where indications are that noise levels are 10 dBA or more above background levels at lek locations or other sensitive areas, the implementation of the above mitigation measure should reduce the impact of noise from production facilities on strutting greater sage grouse or other affected species. Long-term impacts on species affected by increased noise levels could include displacement and decreased production potential, resulting in reduced populations in the Project Area.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on wildlife or fisheries or threatened, endangered, or sensitive species would be expected to occur beyond the current situation.

RECREATION

Proposed Action

Due to the abundance of nearby similar recreational opportunities for hunting, camping, and off-road vehicle use, no noticeable effects on recreational experiences are expected under the Project. Impact to the recreation use of the Project Area would involve a temporary displacement of some hunters, particularly during construction and drilling activities. Some hunters perceive these activities as displacing game species and creating an environment that detracts from the hunting experience. Hunter displacement would be highest during the general deer and elk season when the most users are in the area. The proposed drilling schedule would limit displacement to one season. Hunters could relocate to other hunting areas near the Project Area.

Undisturbed landscapes, isolation and solitude are often important to nonconsumptive users such as photographers and backpackers. Project-related disturbances that adversely impact the characteristic landscape could also contribute to a decline in the recreation experience for these users. There may be some displacement of these users to more pristine landscapes such as the Adobe Town Wilderness study area. The recreation experience for those continuing to use the area would be less satisfying than use under the pre-disturbance conditions described in Chapter 3.

The affects described above would diminish substantially once drilling and construction were completed. However, they would persist at reduced levels. Patterns of game use and population densities would change slightly as a result of implementation of the Project. Some long-term displacement, permanent or relocation, of hunters and nonconsumptive users likely would result under the Project. Further, there may be reduced levels of satisfaction for those recreationists who might continue to use the Project Area. Overall effects on the recreation resource would be minimal due to the short-term nature of drilling and construction activities, and concentrated locations of activities.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on recreation resources would be expected to occur beyond the current situation.

VISUAL RESOURCES

Proposed Action

As noted in Chapter 3, Affected Environment, the Project Area is not pristine. Off-road vehicle tracks exist throughout the area, and are used by ranchers, recreationists and mineral developers. No effects on the existing visual resource management class (Class III) are expected under the Project.

Short-term impacts to the visual resource associated with construction and drilling in the Project Area would include contrasts in line, form, color, and texture. These contrasts would be associated with drilling rigs, construction equipment, service trailers and the general industrial character of drilling activities. Additional impacts may occur from fugitive dust produced by construction activities.

The Project Area would not be visible from Wyoming State Highway 789 or from the community of Baggs. Potential viewers of the contrasts described would be few in number and would include hunters and other recreationists, ranchers, and oil and gas field workers.

In the BLM's VRM rating system, the severity of impact is related to the scenic quality, sensitivity level, and distance zone of the affected environment. In general, short-term impacts would be most severe where the level of contrast is high and is highly visible to potentially large numbers of viewers.

The short-term impacts would exceed the level of contrast permitted in Class III areas; however, because the contrasts would be seen by relatively few viewers and would be short in duration, they would be considered minimal.

Permanent production facilities, as described in Chapter 2, would remain once well drilling activities were completed. The presence of permanent production facilities would have continued impacts over the long-term.

These facilities would create contrasts in line, form, color, texture and overall pattern in the landscape that would remain for the duration of the Project. Fugitive dust impacts as part of ongoing operations would also persist. However, as noted for short-term impacts, these contrasts would not be visible to many viewers. With the application of mitigating measures described in Chapter 2, the level of contrast would not exceed Class III standards. Levels of contrast would, however, detract from the recreation experience of visitors to the Project Area.

Additional fixed facilities such as access roads (improved and unimproved roads and overland routes) would be required to service production facilities. Roads would create additional contrasts in line, color and texture to those described above. With appropriate mitigation, the level of contrast would not exceed Class III standards. However, contrasts could diminish the experience of motorists and recreationists.

Residual Impacts

As a result of siting facilities where they would be least observed, fewer recreationists may be inclined to leave the Project Area.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on visual resources would be expected to occur beyond the current situation.

CULTURAL RESOURCES

Proposed Action

It should be possible to eliminate direct and indirect adverse effects to historic properties through avoidance and/or mitigative measures (i.e., data recovery or recordation) on a case-by-case basis. Potential surface disturbance areas under the Project include portions of three identified sites (48CR7556, 48CR7560, and 48CR5491). The preliminary finding is that site 48CR7556 represents the remains of a prehistoric open camp and is not considered eligible for inclusion in the National Register of Historic Places. The preliminary finding is that site 48CR7560 represents the remains of a prehistoric open camp and is considered eligible for inclusion in the National Register of Historic Places. The preliminary finding is that site 48CR5491 represents the remains of a prehistoric open camp and is considered eligible for inclusion in the National Register of Historic Places.

Direct impacts would primarily result from construction related activities. Activities considered to have the greatest effect on cultural resources include blading of well pads and associated facilities and the construction of roads and pipelines. Sites located outside the Project Area would not be directly affected by the construction activities. If the area of the site crossed by earth disturbing activities does not possess the qualities that contribute to the eligibility of the site, the Project is judged to have no effect. Alteration of the environment abutting eligible historic properties may be considered an adverse effect in the form of a direct impact.

Indirect impacts would not immediately result in the physical alteration of the property. Indirect impacts to prehistoric sites primarily would result from unauthorized surface collecting of artifacts which could physically alter the sites. At historic sites this could include bottle collecting and the introduction of visual impacts.

Contributing segments of historic trails would be avoided by a one-quarter mile buffer zone or outside the visual horizon, whichever is closer. These actions are designed to provide protection for the historic trail corridors. An intensive ground search was conducted, however, no physical

evidence of the Rawlins-Baggs Stage Road was found. The Project is not expected to have an impact on this resource.

Block surveys have been completed in the Project Area, as required by the Interim Drilling Policy. Identification of important sites prior to disturbance would minimize impacts to cultural resources. The likelihood exists that buried sites could be disturbed during construction. Implementation of measures described in Chapter 2 would reduce impacts and minimize the loss of information.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on cultural resources would be expected to occur beyond the current situation.

SOCIOECONOMICS

Proposed Action

Socioeconomic impacts of the Project would be largely positive. The Project would enhance regional economic conditions and generate local, state and federal government tax and royalty revenues. The relatively small, short-term drilling and field development workforce would not generate noticeable population effects or demand for temporary housing or local government services.

The Project would involve capital investment in gas wells, produced water injection wells, gathering systems, compression stations and other field infrastructure. The Project would require between 16 and 36 drilling and field development workers over a 30 to 45-day period and one operations worker as much as a 20 year period (**Table 2-2**).

Development and operation of the Project would require goods and services from a variety of local and regional contractors and vendors, from the oil and gas service industry and from other industries. Expenditures by the proponent for these goods and services, coupled with employee and contractor spending, would generate economic effects in Carbon County, southwest Wyoming and the nation as a whole. The Project may create up to three new indirect jobs (defined as jobs which become available in support industries as a result of Project activities).

It is reasonable to assume that the direct and indirect economic benefits of the Project would be positive.

Carbon County Oil and Gas Activity

Successful completion of the Project would increase natural gas production in Carbon County, particularly during the first several years of production. In 1999, a total of 127 APDs were issued for Carbon County. The 23 wells associated with the Project would be about 19 percent of the 1999 APD level for the county. However, the relatively short drilling time and low infrastructure and labor requirements associated with CBM wells would not result in a substantial increase in drilling activity or drilling employment in the county.

Economic effects on grazing activities would include very small losses of forage due to temporary and long-term disturbance, until revegetation of disturbed areas is successful. Temporary disturbance could result in a very small reduction in grazing activity. If grazing activity does not increase accordingly in nearby areas, the associated grazing economic activity in Carbon County could be lost. A recent UW study estimated that each AUM of cattle grazing was worth $65.07 in total economic impact in the region (UW 2000). Using this estimate, the Project could result in a loss of $65.00 annually in the Doty Mountain Allotment and $130.00 annually in the Cherokee Allotment for the life of the Project.

Some hunters and other recreationists may be temporarily displaced from the area associated with the Project during drilling and field development. The effects of the Project on the Carbon County hunting and recreation economy are not expected to be noticeable, given the short-term nature of the drilling and field development period, and the potential that hunters and recreationists may use other areas within Carbon County during this period.

Population Effects

Population effects of the Project would not be noticeable. Some of the skills and services required for the Project are available in the local labor pool, although the recent increase in both conventional oil and gas and CBM drilling activity in southwest Wyoming has absorbed much of the available oil and gas service workforce. Of the short-term demand for 16 to 36 drilling and field development workers, some would likely be contractors from other areas of Wyoming (Rock Springs, Gillette, Casper) and from northern Colorado. The remainder would be hired from the local workforce. Given the short duration of the drilling phase (under two months), most nonlocal workers relocating to Carbon County would be of single status, i.e., without family members.

Nonlocal workers would attempt to obtain temporary housing as close to the work site as possible, most likely in Baggs. Workers not able to secure temporary housing in Baggs might locate in Rawlins or Rock Springs, Wyoming, or in Craig, Colorado. Given the current level of drilling and field development activity occurring in Wamsutter, it is unlikely that Blue Sky project drilling and field development workers would find temporary housing accommodations in that community.

Given the relatively small workforce and short-term nature of the drilling and field development phase of the Project, area businesses could accommodate the increase in economic activity with existing employees.

Temporary Housing Demand

The relatively small demand for temporary housing during drilling and field development under the Project could be accommodated by existing temporary housing resources. Demand may be accommodated in Baggs, Rawlins, Rock Springs and/or Craig, depending on seasonal considerations and other oil and gas industry activity.

Law Enforcement and Emergency Response

The relatively small level of field development and operations activity would be accommodated by existing law enforcement and emergency management resources.

Fiscal Effects

If CBM wells drilled under the Project are productive, the fiscal effects from the facilities developed and the CBM that could be produced from the Blue Sky Project would be considerable. These effects would contribute to the financial well being of Carbon County, including its schools and roads, the State of Wyoming, and the U.S. Treasury.

The production of CBM would generate revenues for the U.S., the State of Wyoming, and Carbon County from the following sources. The distribution of these revenues would vary, but revenues from most sources listed would be shared. Revenue sources consist of the following: federal and state oil and gas royalties, severance taxes, property taxes, sales and use taxes, ad valorem taxes, and federal and state income taxes of those engaged in or supporting CBM development. These increased revenues would be realized for the life of the Project.

To gain an understanding of the potential economic effect of CBM development in the Project Area, estimates can be made based on assumptions regarding methane production rates, sales expectations, and the productive life of a CBM well. Since no reliable data for the Atlantic Rim area will be available until sufficient exploratory drilling evaluates the area, the assumptions presented here for the purpose of this analysis may change.

For the purpose of this analysis, if each successful CBM well in the Blue Sky Project has a productive life of 15 years, and produces on average, nearly 100 mmcf per year of methane, and this methane is sold for $2.50 per mcf, the sales value of each well would be about $3,500,000. If 20 federal CBM wells within the Blue Sky Project were productive, the federal royalties would be nearly $9,000,000. The severance tax collected by the State of Wyoming would exceed $4,000,000. The ad valorem taxes collected by Carbon County also would exceed $4,000,000. These values are approximate and are intended to give an idea of the order of magnitude of possible fiscal effects.

Environmental Justice

The Project would not directly effect the social, cultural, or economic well-being and health of minorities or low income groups. The Project Area is relatively distant from population centers, so no populations would be subjected to physical impacts from the Project.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No federal mineral royalties would be gathered. No additional socioeconomic effects would be expected to occur beyond the current situation.

TRANSPORTATION

Proposed Action

Federal and State Highways

The Project would generate increases in traffic volumes on highways providing access to the Project Area and on county and operator-maintained roads within the Project Area. These increases would result from the movement of Project-related workers, equipment and materials to and from the Project Area to perform drilling, field development, well service, field operations and reclamation activities.

Table 2-2 shows the estimated average number of trips associated with various well field activities. According to information provided by the proponent, drill rigs, water trucks and other items of heavy equipment would be transported to the Project Area and remain within the Project Area until drilling is completed. Materials and supplies would be delivered on a weekly basis and stockpiled within the Project Area at a staging area. Drilling and completion crews and other personnel would commute to the Project Area daily, except for drilling engineers who would stay in a trailer at the drill site during the work week. Based on these plans and the estimates contained in the table, the Project would generate between 15 to 20 round trips per day over a 45-day period during drilling and field development. After the drilling and field development phase is completed, Proposed Action-related traffic would average one or two trips per day, with slightly higher peak periods when maintenance activities are performed on wells and facilities.

Based on these assumptions and estimates, the incremental increase in area traffic associated with the Project would not result in a significant deterioration of level of service for I-80 or SH 789 (Rounds 2000).

Given the relatively small increment of traffic and the relatively short duration of the drilling and field development phase, it is unlikely that the Project would result in a measurable increase in accident rates on federal and state highways; during the operations phase, the probability of an increase in accident rates attributable to the Project is negligible.

County Roads

The Project would result in increases in traffic on the county roads that provide access to the Project Area (CCR 605 and CCR 608). The relatively small, short-term increases in traffic are

unlikely to result in significant deterioration of the roads or substantial increases in accidents. The primary effects of Proposed Action-related traffic on county and BLM roads would be to accelerate road maintenance requirements. The cost associated with accelerated road maintenance requirements on county roads may be offset by the Proposed Action-related revenues generated to county government, which are described under Socioeconomics.

Increased traffic would generate an increase in the potential for vehicle/stock accidents, although the slower speeds required by the condition of county roads tend to minimize the frequency of such accidents (Warren 2000). Coordination with livestock operators during sensitive periods (e.g., cattle movements and calving season) could further reduce potential for vehicle/stock accidents.

Internal Roads

The Access Road Construction section in Chapter 2 describes the measure proposed by the proponent to develop the transportation network necessary to access wells and ancillary facilities within the Project Area. Based on these proposals, an estimated 7.4 miles of new roads would be constructed within the Project Area. The operator would be responsible for constructing and maintaining new and improved roads within the Project Area, therefore, no fiscal impacts are anticipated for the BLM or Carbon County.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional transportation effects would be expected to occur beyond the current situation.

HEALTH AND SAFETY

Proposed Action

Health and safety impacts of the Project would include a relatively low risk to Project workers from industrial accidents, firearm accidents and natural disasters. There would be a slight increase in risk of traffic accidents and range fires for the general public during drilling and field development and a negligible increase during field operations.

Occupational Hazards

During the 45-day drilling and field development phase of the Project when a peak of 36 workers may be employed, the statistical probability of injuries is low. During field development, the annual statistical probability of injuries is minimal, given that only one worker would be employed.

The BLM, WOGCC, WDEQ, OSHA, and USDOT each regulate certain safety aspects of oil and gas development. Adherence to relevant safety regulations on the part of the Proponent and

enforcement by the respective agencies would reduce the probability of accidents. Additionally, given the remote nature of the Project Area, and the relatively low use of these lands by others (primarily grazing permittees and hunters), occupational hazards associated with the Project would mainly be limited to employees and contractors rather than the public at large.

Pipeline Hazards

Increasing the miles of gathering line within the analysis area would increase the chance of a pipeline failure. Therefore, the relatively small amount of new pipeline associated with the Project, coupled with the low probability of failure and the remoteness of the Project Area would result in minimal risk to public health and safety. Signing of pipeline rights-of-way would reduce the likelihood of pipeline ruptures caused by excavation equipment, especially in the vicinity of road crossings or areas likely to be disturbed by road maintenance activities.

Other Risks and Hazards

Risks to public health and safety are not expected to increase under the Project. Highway safety impacts are discussed under Transportation. Sanitation and hazardous material impacts would be avoided or reduced by the implementation of the mitigation measures outlined in Chapter 2.

The potential for firearms-related accidents would occur primarily during hunting season. If drilling and field development would occur during hunting season, the substantial activity in the Project Area would encourage hunters to seek more isolated areas, thus reducing the potential for accidents. The relatively few personnel on site during production operations would result in minimal risk of firearms-related accidents.

The risk of fire in the Project Area would increase under the Project but would remain minimal. Fire is a potential impact associated with construction activities, industrial development and the presence of fuels, storage tanks, natural gas pipelines and gas production equipment. This small risk would be reduced further by the placement of facilities on pads and locations that are graded and devoid of vegetation. In the event of a fire, property damage most likely would be limited to construction or production related equipment and range resources. Fire suppression equipment, a no smoking policy, shutdown devices and other safety measures typically incorporated into gas drilling and production activities also would minimize the risk of fire. There would be a heightened risk of wildfire where construction activities place welding and other equipment in close proximity to native vegetation. Given the limited public use and presence in the Project Area, the risk to the public would be minimal. There would be a small increase in risk to area fire suppression personnel associated with the Project.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional effects on public health or safety would be expected to occur beyond the current situation.

NOISE

Proposed Action

Noise associated with construction and natural gas production operations can create a disturbance that affects human safety (at extreme levels) or comfort as well as modify animal behavior. Determining activities that exceed the maximum standards is not a simple issue since perception of sound varies with intensity and pitch of the source, air density, humidity, wind direction, screening/focusing by topography or vegetation, and distance to the observer. Noise levels in excess of the 55 dBA maximum standards can occur at construction and production operations. Noise levels around a compressor engine contained in an enclosed building would be below 55 dBA at an estimated 600 feet from the compressor site (BLM 1999b). Construction-related impacts would be short-term, lasting as long as construction activities were ongoing at well sites, access roads, pipelines, and other ancillary facilities such as compressor sites. Noise would be created over a longer term at the individual well sites as a result of production facilities.

Given the low human population densities in the Project Area, construction and development operations under the Project would be sufficiently distant from residences that none would likely be affected by construction or development operations. Overall noise produced by construction and support services equipment during peak activity periods would be moderate because of its dispersed and short-term nature.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. No additional noise effects would be expected to occur beyond the current situation.

CUMULATIVE IMPACTS

Proposed Action

Cumulative impacts are those that would result from the incremental impacts of the Project when added to non-Project impacts resulting from past, present, and reasonably foreseeable future actions (RFFAs). Reasonably foreseeable development is that any development likely to occur within the Project Area, or cumulative impact assessment area (CIA) within the next five years. CIA areas vary between resources and are generally based on relevant landscapes, resources, projects, and/or jurisdictional boundaries.

The only major resource development currently proposed near the Project Area is the exploration activity planned under the Interim Drilling Policy for the Atlantic Rim CBM Project Area (**Appendix A)**. Thus, the effects of the Blue Sky Project (described in this chapter) would not overlap cumulatively with the effects of current or reasonably foreseeable projects or activities other

than the interim drilling program, grazing activities, and existing or planned prescribed burns within the Atlantic Rim CBM Project Area.

The Interim Drilling Policy allows a maximum of 200 coalbed methane wells within the Atlantic Rim CBM Project Area, for research and exploratory purposes, during the interim period while the Atlantic Rim EIS is prepared. Wells will only be allowed in the nine pods the operators have proposed and a maximum of only 24 coalbed methane wells will be allowed within any pod, regardless of multiple zones to be evaluated. Surface-disturbing activities for these 200 wells may affect an estimated 650 acres, including an estimated 60 miles of new road access (new roads associated with the interim drilling program will likely be in the form of spur roads from the existing road network) and an estimated 100 miles of water and gas flowlines. If productive, and following reclamation of short-term disturbance, long-term disturbance associated with the 200-well interim drilling program would likely affect an estimated 200 acres. These 200 acres would be reclaimed at the conclusion of the interim drilling program. Total distance between pods 1 and pod 9 is about 40 miles. The distances between the individual pods vary, from 1.5 miles between pods 2 and 3, to over 6 miles between pods 7 and 8. The Blue Sky Project is part of the 200-well interim drilling program, and is also known as pod 7.

Past or existing actions on or in the vicinity of the Project Area that continue today and have major influences on the area include the road network, non-CBM oil and gas wells, ranching/livestock facilities (i.e. fences, stock watering facilities, ranch houses, power lines, and pipeline, etc.), prescribed burns, and previously approved CBM wells and associated facilities. **Table 4-1** provides a summary of the cumulative impacts analysis requirements for each of the resource values in the other eight pods associated with interim development in pod 7.

Table 4-1
Cumulative Impacts Analysis Matrix - Cumulative Impacts Associated with the Blue Sky Project (Pod 7)

Resource Value	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 8	POD 9	Discussion
Geology	X	X	X	X	X	X	X	X	All wells completed in the Almond Formation of the Mesaverde Group
Air Quality	X	X	X	X	X	X	X	X	All in Laramie Air Basin
Soils	O	O	O	O	X	X	X	0	Impact discussion limited to Muddy Creek CIA area
Surface Water	O	O	O	O	X	X	X	O	Pod 7 located in Muddy Creek CIA area; Pod 7 would have no impacts on other watersheds
Groundwater	X	X	X	X	X	X	X	X	Production of groundwater for all Pods from coalbed formations
Vegetation	O	O	O	O	X	X	X	O	Limit impact discussion to the Muddy Creek CIA area
Range Resources	O	O	O	O	X	X	O	O	Pods 5, 6, 7 in the Doty Mountain Allotment

Table 4-1
Cumulative Impacts Analysis Matrix - Cumulative Impacts Associated with the Blue Sky Project (Pod 7)

Resource Value	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 8	POD 9	Discussion
Wildlife	X	X	X	X	X	X	X	X	Greater Sage grouse habitat in all pods, no surface occupancy within ¼ mile of leks & within greater sage grouse crucial wintering areas. No drilling in prairie dog towns without black-footed ferret clearance
Crucial Winter Range (CWR)	O	O	O	O	O	X	O	O	Pod 6, 7 pronghorn CWR
Recreation	X	X	X	X	X	X	X	X	Minimal displacement of hunters & recreationists
Visual	X	X	X	X	X	X	X	X	Minimal displacement of recreationists
Cultural	O	O	O	O	O	O	O	O	Block surveys required in each Pod, with additional mitigation; no cumulative relationship
Socioeconomic	X	X	X	X	X	X	X	X	All pods within the same socioeconomic area
Transportation	X	X	X	X	X	X	X	X	Increased traffic
Health and Safety	X	X	X	X	X	X	X	X	Major related health and safety issues related to travel
Noise	O	O	O	O	O	O	O	O	Localized affect on wildlife

X - Discussed in the CIA;
O - Not discussed in the CIA (no cumulative relationship)

The CIA area for soils, vegetation and wetlands, and water resources is the 219,500-acre portion of the Muddy Creek Watershed, which overlaps the Atlantic Rim Project Area. To date, 109 CBM and non-CBM oil and gas wells have been drilled within this area. Of that total, 59 non-CBM wells have been plugged and abandoned and are within various stages of reclamation; and 37 non-CBM wells are in various stages of completion, resulting in approximately 337 acres of cumulative, long-term disturbance (related facilities disturbance included) from non-CBM oil and gas development. To date, 13 CBM wells and CBM water injection wells, and related facilities, have been drilled, resulting in approximately 13 acres of cumulative, long-term disturbance from CBM development.

Assuming pod 8 contains the maximum number of wells allowed by the interim drilling program (24), the total number of wells in pods 5,6,7 and 8 would be 86. Pods 5, 6, 7, and 8 are located within this CIA area and would account for approximately 221 acres of reasonably foreseeable short-term disturbance and 101 acres of long-term disturbance. Applications for Permits to Drill (APDs) have already been filed for 74 of the CBM wells and CBM injection wells associated with these pods. APDs also have been filed for 25 non-CBM oil and gas wells within the Atlantic Rim Project Area, six of which are in the Muddy Creek Watershed (no estimate of acreage affected is available).

The existing long-term disturbance of 350 acres resulting from past and current CBM and non-CBM oil and gas activities, added to the reasonable foreseeable long-term disturbance associated with the four pods under the 200-CBM well interim drilling program proposed for the Atlantic Rim (approximately 101 acres) area totals 451 acres, or (0.2 percent) of anticipated cumulative oil and gas-related disturbance within the 219,500-acre Muddy Creek CIA area.

Within the larger Atlantic Rim CBM Project Area, a total of 165 CBM and non-CBM oil and gas wells have been drilled. Eighty of these wells have been plugged and abandoned and are in various stages of reclamation. The 165 well total includes the 109 described within the Muddy Creek watershed. This oil and gas activity is summarized in Table 4-2.

Table 4-2
Oil and Gas Activity within the Atlantic Rim Project Area

Type of Activity	Muddy Creek Watershed	Atlantic Rim Project Area	Total Wells
CBM Well (Spudded)	2	1	3
CBM Well	10	0	10
Oil Well (Spudded)	20	0	20
Oil Well (Completed)	1	19	20
Oil Well (Plugged & Abandoned)	48	16	64
Non-CBM Gas Well (Spudded)	0	7	7
Non-CBM Gas Well (Completed)	16	7	23
Non-CBM Gas Well (Plugged & Abandoned)	11	5	16
Non-CBM Water Injection Well	1	1	2
Total Wells (Existing)	109	56	165

* Data provided by the BLM Reservoir Management Group and the Wyoming Oil and Gas Conservation Commission, 9/2001

Geology/Minerals/Paleontology

Existing, proposed, and reasonably foreseeable actions would not affect landslide deposits and would be unlikely to trigger geologic hazards such as landslides, mudslides, debris flows, or slumps, no incremental increase in cumulative impacts associated with geologic hazards would occur. If the terms of the Interim Drilling Policy are followed and proper well pad and facility siting, construction, and reclamation techniques are used, the cumulative impacts to the surface geologic environment would be minimized. Proposed and RFFAs would require the restoration of disturbed lands to pre-disturbance conditions and as such would minimize topographic alterations. Standard stipulations and Project- and site-specific construction and reclamation procedures would be required for additional development on federal lands and these measures would further minimize cumulative impacts of surface geologic environment.

With the exception of CBM, no major surface mineral resources would be impacted by the implementation of the RFFAs. Protection of subsurface mineral resources is provided by the BLM and WDEQ casing and well bore cementing policy.

Drilling exploratory CBM wells would contribute to the cumulative knowledge of the occurrence or absence of recoverable CBM resources within the area encompassed by the Atlantic Rim CBM Project, which is currently being evaluated by the BLM in an EIS. The Atlantic Rim Project Area encompasses 310,335 acres within portions of T.13-20N. and R.89-92W. If productive, these 200

wells would contribute to the cumulative CBM production from the Atlantic Rim Project Area and Wyoming, while at the same time adding to the overall depletion of CBM resources within the same area.

No cumulative adverse impacts on paleontological resources would occur beyond those discussed earlier in this chapter under the Project, as a result of the Project being implemented in combination with other existing, proposed, and reasonably foreseeable actions. Adoption of mitigation measures prescribed in that section could foster cumulative beneficial effects by discovering new fossil resources or providing paleontologists with evidence of absence of such resources in the area.

Air Quality

Cumulative impacts from emissions resulting from the implementation of past oil and gas projects and the proposed 200-well program would be much the same as those found on similar oil and gas projects such as the Continental Divide project. Emissions from oil and gas facilities approved prior to 1999 were included in the 3,000-well air quality analysis prepared for the Continental Divide EIS, of which only 2,130 wells were approved. The emissions from the 200 well interim drilling program have been accounted for under the air quality model completed for the Continental Divide project.

RFFAs, including the relatively small number of exploratory wells and facilities in the interim drilling program, would generate only a small amount of air pollutants. Some temporary effects on air quality would likely occur in the immediate vicinity of interim drilling activities due to particulate matter and exhausts from vehicles and equipment. These effects would be local and would be dispersed by prevailing winds from the west. The effects on air quality would be minimized through the application of dust abatement practices.

No noticeable deterioration in visibility would occur at Class I or sensitive Class II wilderness areas located within 100 miles of interim drilling activities (Mount Zirkel, Rawah, Savage Run, Platte River, Huston Park, or Encampment River). No noticeable deterioration in visibility would occur at the Dinosaur National Monument. Wind dispersion of the small quantity of air pollutants generated by RFFAs would likely eliminate the formation of regional haze or acid deposition.

Soils

The CIA area for soils includes the 219,500-acre portion of the Muddy Creek Watershed which overlaps the Atlantic Rim Project Area (Muddy Creek CIA area). Cumulative impacts include soil impacts from ongoing exploration and development activities, recently constructed projects, and RFFAs. Cumulative long-term disturbance of 451 acres would be approximately 0.2 percent of the 219,500-acre Muddy Creek CIA area. This amount of cumulative impacts upon the soil resources would be minimal, provided that all mitigation and avoidance measures are implemented.

With the use of proper construction techniques, drilling practices, and with BMPs described earlier in this Chapter under Soils and Water Resources, no adverse effects on soils would be anticipated under the interim drilling program. Surface disturbance associated with drilling activities, such as removing vegetation and stockpiling topsoil, road construction, or shallow excavations for drill pads or facilities, would increase the potential for increased erosion and sedimentation. Implementation

of BMPs to control erosion would ensure that soil resources would not be affected by interim drilling activities. Use of BMPs during construction, operation, and reclamation activities would minimize effects on soil resources.

Water Resources

The CIA area for water resources includes the 219,500-acre portion of the Muddy Creek Watershed which overlaps the Atlantic Rim Project Area (Muddy Creek CIA area). Existing and future disturbance consists of approximately 451 acres, or 0.2 percent of the Muddy Creek CIA area. This cumulative disturbance would minimally impact surface water or groundwater quantity or quality.

The cumulative impacts would be associated with CBM interim drilling activities and would be predicted to occur are based upon the current knowledge of the geology, CBM resources and groundwater hydrology in the area. Both methane and water production rates from future CBM wells, and specifics related to groundwater injection, cannot be accurately predicted. These variables could potentially affect the configuration of field production, gas processing, and gas and water conveyance facilities; however, none of these changes are expected to measurably affect the conclusions presented herein. Federal regulations provide for additional analysis if substantial changes in resource conditions would alter the conclusions reached herein.

Cumulative impacts to surface water resources would be maximized shortly after the start of construction activities, decreasing in time due to reclamation efforts, then stabilizing during the production/operation period when routine maintenance of wells and ancillary facilities takes place. Additionally, all roads, well locations and facility infrastructure would be regularly inspected and maintained to minimize erosion, sedimentation and surface water quality impairment.

Impacts to groundwater within the Atlantic Rim Project Area are not anticipated. The springs in the area are classic "contact" springs which result from permeable rocks overlying rocks of much lower permeability. In the Atlantic Rim Project Area, the permeable Browns Park Formation overlies the less permeable Almond Formation, which is a member of the Mesaverde Group. Water easily percolates through the Browns Park, and is perched on the lower permeability clay and shales of the Almond. Where this contact is exposed by erosion, a line of springs can result. No impact to these springs is foreseen from pumping on the Almond Formation coal seams during the interim drilling program. The source of the springs is infiltrating precipitation, and this source would not be removed by pumpage of the underlying coal seams.

Due to thick confining layers, water wells completed in water-bearing strata above or below the Almond coal seams are not likely to be impacted. Water wells completed in the Almond Formation coal seams in close proximity (less than one mile) to the pod could be impacted, but it is not likely that wells of this type exist. As described in Chapter 2, water analysis is being completed to determine if water from the Almond Formation coal seams contributes to the surface water system in the Colorado River Basin.

Cumulative impacts to the groundwater resources within the Mesaverde Group would be limited to a decline in hydrostatic head in coal seams within the targeted coalbed formations resulting from development wells associated with the interim drilling program. For purposes of this analysis,

existing impacts to groundwater resources within the Mesaverde Group resulting from prior development are so limited as to be nonexistent.

Current and future oil and gas exploration and development activities in the Project Area must comply with federal and state environmental regulations. Therefore, impacts to groundwater quantity or quality on a cumulative scale are not expected. This is particularly true given the fact that wells would be completed in accordance with Onshore Order No. 2 and the recent BLM guidelines that reduce the potential for groundwater contamination.

With the use of proper construction techniques, drilling practices, and with BMPs similar to those described in Chapter 2 as applicant-committed and BLM-required mitigating measures, and earlier in this Chapter under Soils and Water Resources, no adverse effects on groundwater aquifers or groundwater quality would be anticipated under the interim drilling program. Surface disturbance associated with oil and gas drilling activities, such as removing vegetation and stockpiling topsoil, road construction, or shallow excavations for drill pads or facilities and existing burned areas within the CIA would increase the potential for erosion and sedimentation. Due to their effects on vegetation (see following section) burns, prescribed and otherwise, would increase the potential for erosion and sedimentation for the first two years following the burn. Implementation of BMPs to control erosion would ensure that surface water resources of the Colorado River Basin would not be affected by surface-disturbing activities.

Vegetation/Wetlands/Noxious Weeds

The CIA area for vegetation/wetlands/noxious weeds includes the 219,500-acre portion of the Muddy Creek Watershed which overlaps the Atlantic Rim Project Area (Muddy Creek CIA area). Cumulative impacts include impacts to vegetation and wetlands from ongoing exploration and development activities, recently constructed projects, prescribed burns where sagebrush cover type has been converted to grass and bare ground, and RFFAs.

Within a 500,000 acre area that includes the CIA, approximately 20,000 acres have been burned as a result of prescribed burns and 4,000 acres have been burned by wildfire over the past fifteen years. In prescribed burns the objective is not to burn all vegetation, but to leave mosaics of burned and unburned vegetation. These burns are in various stages of recovery.

Anticipated cumulative long-term disturbance that can be quantified (451 acres) would be approximately 0.2 percent of the 219,500-acre Muddy Creek CIA area. This amount of vegetation loss would be minimal, and no direct effects on wetlands or aquatic and riparian areas would be expected, because existing and reasonably foreseeable activities would avoid these areas in accordance with RMP provisions. Provided erosion mitigation measures are followed, no indirect aquatic or riparian impacts would be expected. Use of BMPs during construction, operation, and reclamation activities would minimize effects on vegetation resources. Use of BMPs also would minimize the potential for invasive weedy species to increase during reasonably foreseeable activities. Cumulative impacts upon both vegetation and wetland resources would be minimal, provided all mitigation and avoidance measures specified by the RFO are implemented. The cumulative impact of existing and reasonably foreseeable activities and prescribed burns in the CIA would be a reduction in sagebrush cover type and in sagebrush-dependent habitat types. An

estimated 95 percent of BLM prescribed burns occur in mountain big sagebrush and basin big sagebrush. Wyoming big sagebrush, the main forage for big game and main habitat for sage grouse would not be affected.

The distribution of plant species of concern is likely limited within the Atlantic Rim Project Area due to a lack of suitable habitat for most of the species. The required application of existing FWS and BLM monitoring and mitigation measures would be expected to provide adequate protection for threatened, endangered, and special status plant species. Thus, impacts to special status species would be expected to be minimal.

Range Resources and Other Land Uses

The CIA area for range resources and other land uses includes the 219,500-acre portion of the Muddy Creek Watershed which overlaps the Atlantic Rim Project Area (Muddy Creek CIA area). Cumulative impacts include those from ongoing exploration and development activities, recently constructed projects, and RFFAs. Cumulative long-term disturbance of 451acres would be approximately 0.2 percent of the 219,500-acre Muddy Creek CIA area. This amount of cumulative impacts upon range resources and other land uses would be minimal, provided that all BMPs are implemented.

RFFAs located within the Doty Mountain Allotment include the Blue Sky Project, the Doty Mountain Project, and the Sun Dog Project. Only the Blue Sky Project is located within the Cherokee Allotment. Based on the anticipated disturbance associated with these RFFAs, the cumulative disturbance would be approximately 65 acres in the Doty Mountain Allotment and 15 acres in the Cherokee Allotment. The estimated 80 acres of cumulative long-term disturbance equates to a very small reduction in available forage within the Doty Mountain and Cherokee Allotments.

Wildlife/Fisheries

Wildlife

RFFAs, including the interim drilling program, are expected to have minimal cumulative, short-term effects on wildlife. Some wildlife species may be temporarily displaced from well sites, access road locations, and pipeline routes by construction activities, but should return once construction is complete. Extensive suitable habitats for many species exist on adjacent lands, and would support any individuals that may be temporarily displaced during RFFAs. Cumulative long-term effects on wildlife also are expected to be minimal, as most species would become accustomed to routine operation and maintenance activities. Only a very small proportion of the amount of available wildlife habitats within the Atlantic Rim Project Area would be affected. The capacity of the area to support various wildlife populations should remain essentially unchanged from current conditions. No cumulative effects on wildlife, including threatened or endangered species, or species of concern, are expected during RFFAs, including the interim drilling program, provided avoidance and mitigation measures, lease stipulations and RMP provisions, are followed.

The CIA area varies with species, as indicated within the respective analyses. The disturbance of wildlife habitat resulting from implementation of RFFAs, including the interim drilling program

would reduce habitat availability and effectiveness for a variety of common mammals, birds, and their predators. Initial phases of surface disturbance would result in some direct mortality to small mammals, displacement of songbirds, along with a slight increase in mortality from increased vehicle use. Due to the relatively high production potential of these species and the relatively small amount of habitat disturbed (0.006 percent of the Atlantic Rim Project Area), small mammal and songbird populations would quickly rebound to pre-disturbance levels following reclamation, and no long-term impacts to these populations are expected.

RFFAs, including activities associated with the construction phase of each of the pods in the interim drilling program, would likely temporarily displace antelope, mule deer, and elk; however, once construction is completed they would likely habituate and return to pre-disturbance activity patterns. Elk winter range does not occur on any of the pods and should not be affected by interim drilling activities. Pronghorn CWR occurs only in the Blue Sky Project Area. The proportion of pronghorn CWR within the Baggs Herd Unit that would be affected over the short-term and long-term, would be 0.03 and 0.008 percent, respectively. Mule deer CWR occurs in pods 8 and 9. The proportion of mule deer CWR within the Baggs Herd Unit that would be affected over the short-term and long-term, would be 0.05 and 0.01 percent, respectively. Construction activities on CWR would be limited to May 1 through November 14. Prescribed burns are not expected to impact big game as the burns would not affect dominant forage. Provided that mitigation measures contained in Chapter 2 and the Interim Drilling Policy are implemented, cumulative impacts to big game populations within their respective herd units are expected to be minimal.

Greater sage grouse occupy the area where interim drilling activities are proposed year-round and make seasonal use of the habitats. No exact figures on the amount of sage grouse habitat available within the Atlantic Rim Project Area exist, but the RMP identifies the area as lying within the area for which the Baggs Habitat Management Plan was prepared. In this larger area, 160,500 acres of sage grouse habitat was identified. Prescribed burns are not expected to impact sage grouse, as the height and density of the sagebrush typically treated by burns are outside of the range used by sage grouse for nesting and brooding habitat. One crucial winter habitat unit and two leks occur on pod 1, and a portion of pod 8 lies within the one-quarter mile NSO radius of a lek. Approximately 11,005 acres (56.2 percent of the total surface area of the nine pods) overlaps the 2-mile radius of the historical leks in the area. Approximately 365 (3.3 percent) and 112 (1.0 percent) acres of potential greater sage grouse nesting habitat would be affected cumulatively by short-term and long-term disturbances, respectively, associated with the production activities. Considering the vast amount of potential nesting habitat available, the 112-acre loss would be minimal. Greater sage grouse within Sierra Madre Upland Game Management Unit (Area 25) would only be minimally impacted from the cumulative 200-acre disturbance associated with RFFAs, including interim drilling activities, provided the implementation of RMP provisions, stipulations, interim drilling guidelines, seasonal closures, reclamation, and mitigation measures specified by the RFO are followed.

Although no active raptor nests were located in the interim drilling pods during 2001 aerial surveys, implementation of protection measures identified in Chapter 2 and the Interim Drilling Policy are expected to protect the raptor populations within the interim drilling area (**Appendix A**) during RFFAs. Therefore, only minimal cumulative impacts to raptors within Muddy Creek Watershed are likely to occur.

Acreages and burrow densities that are adequate to support black-footed ferrets (200 or more acres with eight or more burrows per acre) occur in only two of the pods included in the interim drilling program. Black-footed ferret surveys have been conducted on both of these pods and no ferrets or ferret sign were found. The Blue Sky Project was surveyed in October 2000 and September 2001. The Blue Sky Project was surveyed again in August 2001. Because of the lack of evidence that black-footed ferrets occur and the fact that black-footed ferret surveys will be conducted when required (per interim drilling guidelines), no impacts to this species are expected as the result of RFFAs, including the proposed 200-well interim drilling activities.

Fisheries

Currently, four BLM sensitive fish species are known to occur in Muddy Creek and downstream in the Little Snake River (Baxter and Stone 1995). Although unlikely, four endangered fish species have the potential to occur immediately downstream in the Little Snake River. Cumulative impacts from existing, proposed, and reasonably foreseeable development may influence offsite endangered fisheries resources and therefore potential impacts are evaluated within the boundaries of the Muddy Creek watershed. Additionally, direct impacts to the four BLM sensitive species through increased sediment levels or surface water depletions in Muddy Creek may result from the implementation of interim drilling activities.

Perennial surface waters within the analysis area are limited. Additionally, no "contact" between the surface springs and deep water aquifers planned for use during RFFAs are anticipated. Water used in drilling and construction activities associated with the interim drilling program would be obtained from wells drilled into aquifers that are geologically isolated from the Little Snake River and not generally associated with surface water expression in the Muddy Creek watershed. Therefore, no surface water depletions that would affect BLM sensitive, threatened, or endangered fish species would occur. If the existing, proposed, or reasonably foreseeable development leads to surface water depletion in either Muddy Creek or the Little Snake River (both tributary to the Colorado River and falling under the Colorado River Compact), adverse impacts to the BLM sensitive species could occur, and potential impacts to the four downstream endangered species would require the initiation of consultation with the FWS.

RFFAs are not expected to result in reductions in BLM sensitive, threatened, or endangered adult fish numbers, or their exclusion from, or degradation to their spawning areas within the Muddy Creek watershed or in downstream waters of the Little Snake River. Additionally, permitted disturbances associated with the exploratory CBM pod development and other development within the Muddy Creek watershed would employ erosion control measures and construction techniques suitable to limit offsite soil movement and downstream degradation of fisheries habitat due to sediment inputs.

The mitigation and avoidance measures set forth in this EA, and the application of standard wetland and surface water protection and reclamation measures to protect fisheries resources are likely to be adequate to protect surface waters and the threatened, endangered, and BLM fish species of concern. Thus, the cumulative impacts to fish species found within the affected watersheds are expected to be minimal.

The required application of existing FWS and BLM monitoring and mitigation measures to the proposed CBM interim drilling program is expected to provide adequate protection for threatened, endangered, and special status species.

Recreation

BLM does not have statistics on historical use of the interim drilling area (**Appendix A**) by recreation groups which could be used to determine trends in cumulative impacts on recreation use and displacement resulting from past or current activities and RFFAs. Cumulatively, overall impacts to the recreation resource are expected to be minimal with some temporary displacement of hunters and recreationists during the short-term drilling periods. Some long-term displacement of hunters and nonconsumptive users may occur, and there may be reduced levels of satisfaction for those who might continue to use the area.

Visual Resources

Existing visual qualities in the interim drilling area (**Appendix A**) and adjacent lands have already been affected by ongoing natural gas development, including road building and pipeline construction. Existing, proposed, or reasonably foreseeable development would add to the level of impact to visual resources in the immediate area. The composite experience of those traveling through the area, particularly on back roads, is one of a modified landscape. Contrasts in line, form, color and texture from development activities begin to dominate the viewers experience. These conditions would increase the likelihood that viewers, particularly back country recreationists, would be dissatisfied with the visual component of their recreation experience. However, the cumulative impact of existing, proposed, or reasonably foreseeable development on visual resources would still be consistent with the current VRM Class III designation and implementation of mitigation measures proposed similar to those described in Chapter 2.

Cultural Resources

Cultural resources on public lands, including archaeological sites and historic properties, are protected by federal law and regulations. Cultural resources in the interim drilling area (**Appendix A**) and adjacent lands already may have been affected by surface-disturbing activities, including ongoing natural gas development, road building and pipeline construction. Existing, proposed, or reasonably foreseeable development could add to the level of impact on cultural resources in the immediate area, unless BLM specified inventories and protective or mitigation measures are followed. BLM has required the completion of cultural resource inventories prior to surface-disturbing activities. These inventories have been used to identify sites potentially eligible for inclusion on the National Register of Historic Places and to identify sites which BLM has required past exploration and development activities to avoid.

Because Class III cultural resource inventories would be completed, the potential for increased impacts on cultural artifacts would be minimized. It should be possible to eliminate direct and indirect adverse effects to historic properties under the interim drilling program through avoidance and/or mitigative measures (i.e., data recovery or recordation), on a case-by-case basis. By avoiding known cultural and historical sites during the layout of drill sites, access roads, and pipeline corridors, the potential for incremental increases in cumulative impacts would be avoided.

Completion of cultural resource inventories would have a beneficial, cumulative impact on the level of cultural information available about the interim drilling area (**Appendix A**). Some unintentional damage to subsurface resources could occur during grading or excavation activities. However, implementation of resource protection and mitigation measures similar to those described in Chapter 2 would protect such resources upon discovery.

Socioeconomics

Southwest Wyoming is currently experiencing an increase in the pace and level of natural gas development. Drilling and field development is occurring in areas near the interim drilling area (**Appendix A**) including Continental Divide/Wamsutter II, South Baggs, Mulligan Draw, Creston/Blue Gap, Hay Reservoir and potentially, Desolation Flats. While this surge in development will result in increased employment and income and tax revenues in the region, it will also result in increased housing demand and increased demand for local and state government facilities and services. Rawlins is also experiencing some growth associated with the opening of a new prison facility.

Communities such as Rawlins and Rock Springs are still below peak population levels of the early 1980s and have infrastructure and housing to accommodate some population growth. Smaller communities near the Project Area, such as Wamsutter or Baggs, are struggling to accommodate population growth associated with development of the currently approved natural gas fields identified above. Neither the relatively small, short-term drilling and field development workforce nor the minimal operations employment and activity associated with the existing, proposed, or reasonably foreseeable development would add appreciably to cumulative housing and local government service demand in the area. Drilling and field development associated with these activities would be completed some time before the initiation of the proposed Atlantic Rim CBM project.

If the current accelerated pace of drilling and field development in southwest Wyoming continues, the potential for degradation of the quality of recreation resources in the area would increase. If Carbon County residents perceive that degradation of recreation resources has occurred, levels of dissatisfaction among some residents and area visitors would correspondingly increase.

Transportation

Increased oil and gas development in western Carbon County and eastern Sweetwater County will result in increased traffic on affected segments of I-80 and WSH 789. The condition of these highways is adequate to accommodate existing levels of traffic and some increases (Rounds 2000).

Currently known cumulative impacts on CCR 605 and CCR 608 would be limited to grazing and recreation activities, and occasional traffic associated with oil and gas exploration activities. The increased traffic associated with drilling and field development of the interim drilling program would accelerate maintenance requirements; however, associated costs may be offset by revenues generated, which are described under the Socioeconomics section of this chapter.

Health and Safety

Cumulative health and safety impacts would be limited to those associated with the 200-well interim drilling proposal and existing grazing and recreation activities. Cumulative impacts to health and safety conditions are anticipated to be similar to those described for the Project. Occasional traffic and activity associated with oil and gas exploration activities would generate small increases in risks to workers and the public.

Noise

Cumulative noise impacts would be limited to those associated with the 200-well interim drilling proposal and existing grazing and recreation activities. Cumulative noise impacts are likely to be similar to those described for the Project. Noise would result from ongoing construction, drilling, and CBM operations, including an estimated nine compressor stations, one in each pod, during the life of interim drilling activities. Increased traffic would occur on existing transportation system roads within the area where interim drilling activities are planned (**Appendix A**), thus adding to existing traffic noise. Given the current and anticipated low traffic volumes, and dispersed nature of traffic and CBM operations within the interim drilling pods, the additional traffic-related noise would be minimal. Given the dispersed locations of the interim drilling pods, the noise from one compressor station located in each pod would not likely be noticeable throughout the interim drilling area (**Appendix A**). The distance between the pods also would minimize the overall noise impact on visitors to the area, however, the cumulative additional noise from all RFFAs would combine to create an environment that is no longer pristine. Applicant-committed and BLM-required mitigating measures for interim drilling activities, similar to those described in Chapter 2 for the Blue Sky Project, would result in minimal noise impacts.

No Action

Under the No Action Alternative, the development of the Blue Sky Project of the Atlantic Rim Coalbed Methane Interim Drilling Project would not occur. However, interim drilling activities associated with other pods, not including the Blue Sky Project (Pod 7), likely still could occur. Therefore, if interim drilling activities still were to occur (excluding the Blue Sky Project), the cumulative impacts would be very similar to those described under the Project. If interim drilling activities were not to occur, there would be no additional cumulative impacts on resources occurring in the Atlantic Rim CBM Project Area beyond the current situation.